Computational Systems Biology to Accelerate Research in Complex Disease: Prostate Cancer and Diabetes

The National Center for Integrative Biomedical Informatics (NCIBI)

NCBC Dissemination Event

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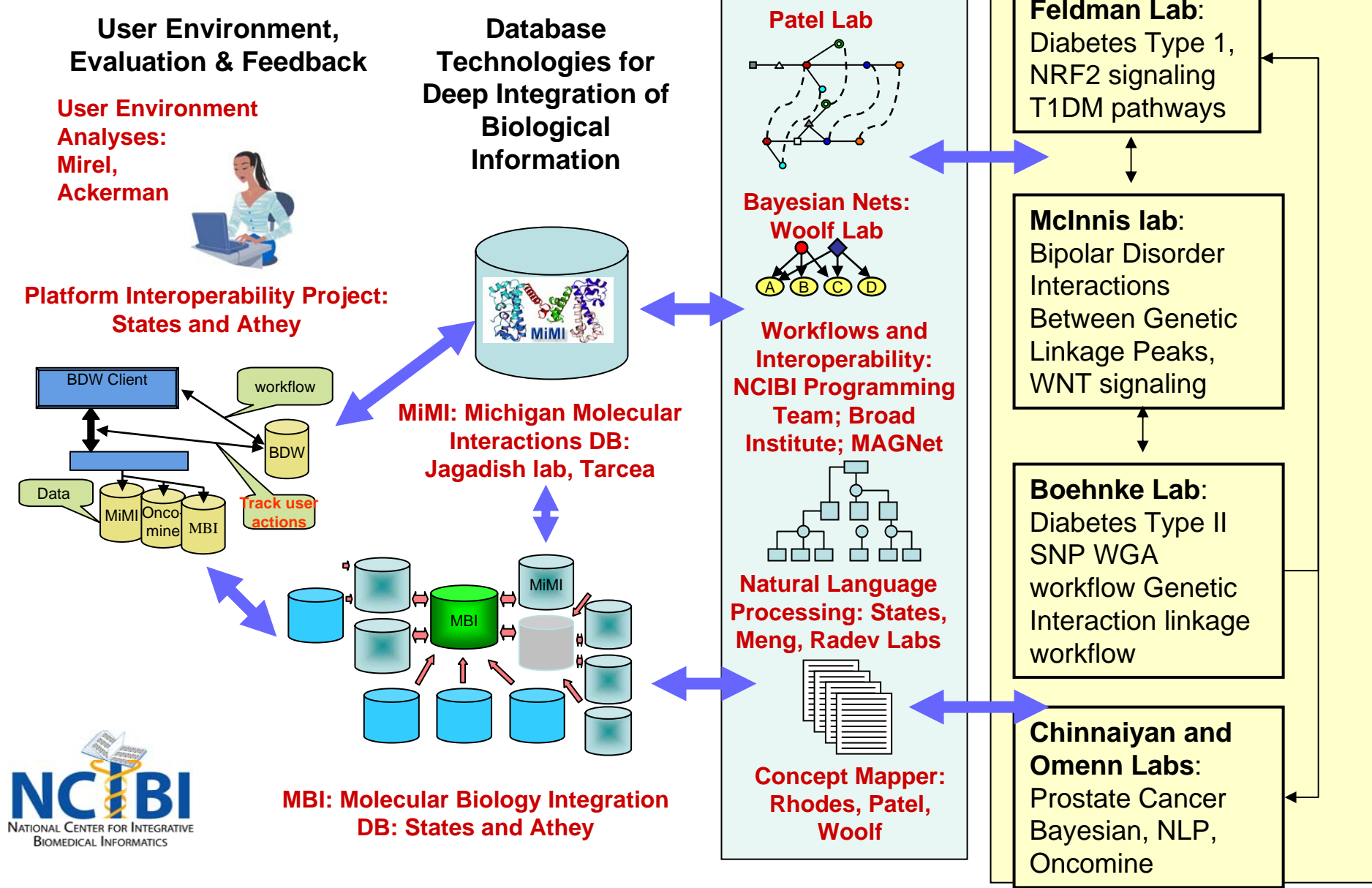Robert Murphy: Carnegie Mellon University (CMU)
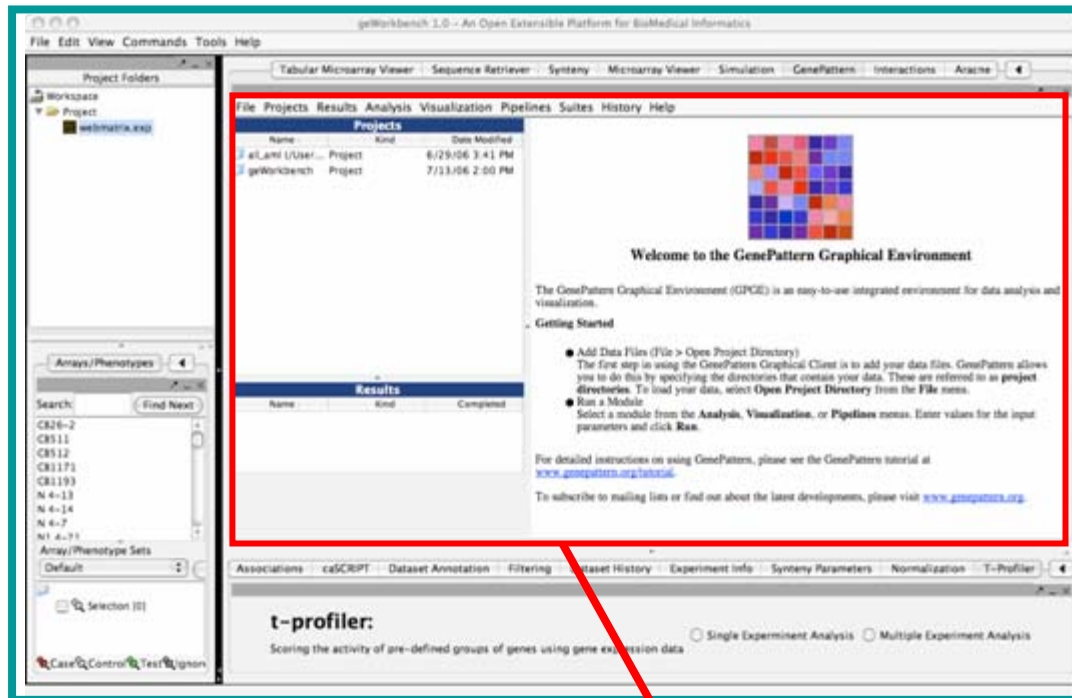
James D. Cavalcoli

Outline and Goals

- Introduction to NCIBI personnel, tools, data, and knowledge bases
  - NCIBI subcontractors: Jill Mesirov (MIT/Broad) and Robert Murphy (Carnegie Mellon University)
- Demonstrate how Integrative Biomedical Informatics can accelerate research with late breaking examples from two NCIBI DBPs: Prostate Cancer and Diabetes T1 Complications
- Stimulate Collaborative R01 and R21 Interest with NCIBI as partner
- Build bridges with other NCBCs and NIH communities (including Intramural research programs)
- Explore novel integrative computational methods and new possibilities for cutting edge biomedical research

Granular Overview of NCIBI Activities Underway: Cores 1-3

User Environment, Evaluation & Feedback

Database Technologies for Deep Integration of Biological Information

User Environment Analyses: Mirel, Ackerman

Platform Interoperability Project: States and Athey

BDW Client

workflow

BDW

Data

MiMI | Onco-mine | MBI

Track user actions

MiMI: Michigan Molecular Interactions DB: Jagadish lab, Tarcea

MiMI

MBI

MBI: Molecular Biology Integration DB: States and Athey

Tools for large-Scale analysis

SAGA: Patel Lab

Bayesian Nets: Woolf Lab

A B C D

Workflows and Interoperability: NCIBI Programming Team; Broad Institute; MAGNet

Natural Language Processing: States, Meng, Radev Labs

Concept Mapper: Rhodes, Patel, Woolf

Driving Biological Problems (Omenn)

Feldman Lab: Diabetes Type 1, NRF2 signaling T1DM pathways

McInnis lab: Bipolar Disorder Interactions Between Genetic Linkage Peaks, WNT signaling

Boehnke Lab: Diabetes Type II SNP WGA workflow Genetic Interaction linkage workflow

Chinnaiyan and Omenn Labs: Prostate Cancer Bayesian, NLP, Oncomine

NCIBI

NATIONAL CENTER FOR INTEGRATIVE BIOMEDICAL INFORMATICS

Future Goal: NCIBI adoption of geWorkbench and GenePattern

geWorkbench application
Execute GenePattern modules from within geWorkbench

GenePattern UI plug-in

GenePattern module repository

geWorkbench modules

Wrap geWorkbench modules as GenePattern tasks